

Application No.: 10/014625

Case No.: 56937US002

Remarks

Claims 1-22 are pending.

§ 112 Rejections

Claim 21 stands rejected under 35 USC § 112, second paragraph, as purportedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Patent Office has repeated its rejection of claim 21 asserting that the claim improperly uses an open-ended term followed by a Markush group. Applicants respectfully submit that claim 21 as written particularly points out and distinctly claims the subject matter that the Applicants regard as the invention.

Specifically, claim 21 provides that "the substrate [of claim 12] comprises a material selected from the group consisting of polyesters, polyolefins, papers, foils, polyacrylates, polyurethanes, perfluoropolymers, polycarbonates, ethylene vinyl acetates, vinyl, fabrics, foam, polymer coated papers, retroreflective sheeting and combinations thereof." In claim 21, the open-ended term applies to the substrate, while the Markush group applies to the material. That is, the substrate must comprise at least one material selected from the Markush group, but the substrate may also comprise additional materials not present in the Markush group. For example, claim 21 would read upon a substrate comprising a polyester film (a material selected from the Markush group) in combination with (e.g., coated with or laminated to) a material not present in the Markush group.

In summary, Applicants submit that the rejection of claim 21 under 35 USC § 112, second paragraph, is unwarranted, and that the rejection should be withdrawn.

§ 103 Rejections

Claims 1-22 stand rejected under 35 USC § 103(a) as being unpatentable over Babu et al. (US 5,112,882) taken in view of either Davison (US 3,970,771) or Hansen et al. (US 5,993,900).

Independent claims 1 and 12 of the present invention recite a primer comprising (a) a maleated thermoplastic elastomer; (b) a non-halogenated polyolefin; and (c) a resin. The maleated thermoplastic elastomer comprises elastomer portions, and the elastomer portions have

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a glass transition temperature. The resin raises the glass transition temperature of the elastomer portions of the maleated thermoplastic elastomer.

Babu is directed toward radiation curable poly(alpha-olefin) pressure-sensitive adhesive compositions. At col. 8, lines 50-56, Babu describes a primer consisting of a triblock copolymer of styrene-ethylene/butylene-styrene grafted with maleic anhydride (Kraton G-1901X) and a primer consisting of a combination of amorphous polypropylene and Kraton G-1901X. (Col. 8, lines 50-56.) As acknowledged by the Patent Office, Babu does not describe, teach or suggest a primer containing a resin in addition to a maleated thermoplastic elastomer and a non-halogenated polyolefin. (See, Paper No. 5, ¶ 3.)

The Patent Office asserts that Davison and Hansen describe the presence of a suitable resin in a closely related primer composition. (See, Paper No. 5, ¶ 3.) However, claims 1 and 12 require that the resin of the present invention raise the glass transition temperature of the elastomer portions of the maleated thermoplastic elastomer. (See, claims 1 and 12, emphasis added.)

According to the Patent Office, the limitation that the resin of the present invention raise the glass transition temperature of the elastomer portions of the maleated thermoplastic elastomer is an inherent property of Davison and Hansen. (See, Office Action dated October 22, 2003; ¶ 3.) Applicants respectfully traverse. As described in the Handbook of Pressure Sensitive Adhesive Technology, 2nd Ed. (D. Satas, Ed.; Van Nostrand Reinhold, New York, New York; 1989 (pages 185-89 are attached)) there is a clear distinction between midblock and endblock compatible resins. Midblock compatible resins increase the midblock glass transition temperature (Tg) without changing the endblock Tg, while endblock compatible resins increase the endblock Tg without changing the Tg of the midblock. (See, page 187 and Table 8-6.)

Hansen describes a primer composition comprising an elastomeric block copolymer and an end-block compatible resin. (See, col. 1, lines 62-67; col. 3, line 39-46; and col. 4, lines 29-31). Hansen further describes that suitable polymers have endblocks giving a resinous segment and a midblock giving an elastomeric segment (col. 2, lines 4-9). Thus, the resins of Hansen are compatible with the resinous segments of the elastomeric block copolymer, not the elastomeric midblock segments. Similarly, Davison teaches resins with a high degree of compatibility with the endblocks and largely incompatible with the elastomeric midblocks. (See, col. 2, lines 26-26; and lines 53-57.)

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Thus, Hansen and Davison describe endblock (i.e., non-elastomeric segment) compatible resins, while the present invention requires a resin that raises the Tg of the elastomeric segment. Therefore, the Patent Office has not shown how the resins of Davison or Hansen would inherently raise the Tg of the elastomeric portions of the block copolymer of Babu.

For at least this reason, the combination of Babu with either Davison or Hansen fails to describe, teach or suggest all of the limitations of claims 1 and 12. Thus, the Patent Office has failed to meet its burden in establishing a prima facie case of obviousness, and the rejection of claims 1 and 12 is unwarranted and should be withdrawn.

Claims 2-11 each depend, directly or indirectly from claim 1 and add patentable features thereto. Claim 1 is patentable for at least the reasons stated above, thus claims 2-11 are likewise patentable. Similarly, claims 13-22 each depend, directly or indirectly from claim 12 and add patentable features thereto. Claim 12 is patentable for at least the reasons stated above, thus claims 13-22 are likewise patentable.

In summary, the rejection of claims 1-22 under 35 USC § 103(a) as purportedly being unpatentable over Babu et al. taken in view of either Davison or Hansen et al. has been overcome and should be withdrawn.

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested.

Allowance of all pending claims, at an early date is solicited.

December 19, 2003

Date

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Handbook of Pressure Sensitive Adhesive Technology

Second Edition

Edited by

Donatas Satas



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NOTE

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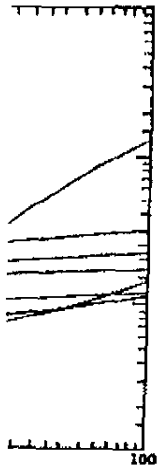
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the slope increases. In the systems containing compatible resins, the 0.1 rad/sec modulus reaches a minimum and then begins to rise, while the slope continues to rise. Additional data at high resin concentrations, not shown on this plot, indicate that these curves tend toward a circle. That is, as the modulus increases at 0.1 rad/sec, the ratio of G' at 100 to G' at 0.1 begins to drop so that the curve begins to bend back upon itself. This is the characteristic for all compatible systems that were examined and also for those that have pressure sensitive properties. The performance of the various incompatible systems is bounded on the upper left, shown by the dash-dot line in Figure 8-30. In this case, the modulus at 0.1 rad/sec increases, but the slope does not change, as was seen earlier. The boundary on the lower left, shown by the dotted line, represents a compatible oil. The modulus G' at 0.1 rad/sec is depressed and there is a slight increase in slope as observed on the curves for natural rubber-oil blend. The pressure sensitive adhesive properties of natural rubber with various resins were characterized (Figs. 8-31 through 8-33). Rubber blends with intercept $2 \times 10^5 < G'\omega = 0.1 < 4 \times 10^5$ dyne/cm², and slope $5 < G'\omega = 100/G'\omega = 0.1 < 300$, have good peel, tack, and shear properties.

Block Copolymer

Figure 8-34 shows the viscoelastic properties of Kraton block copolymer blends with low molecular modifying resins. The rubber-resin compatibility data can be obtained from these curves. As mentioned in the previous section, a block copolymer has two glass transition temperatures. A T_g at 90°C relates to the



frequency at 25°C.



nds.

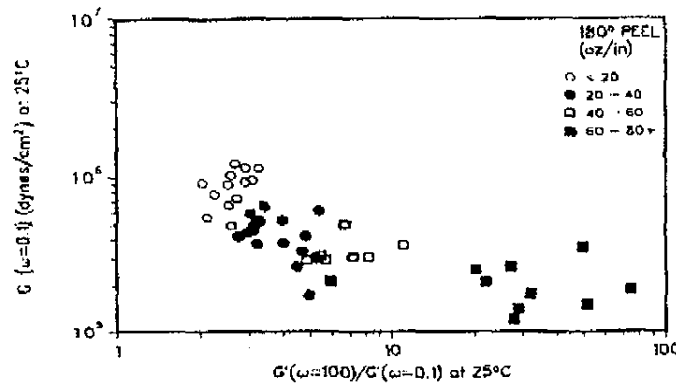


Fig. 8-31. 180° peel data vs. RDS data (NR/resin system).

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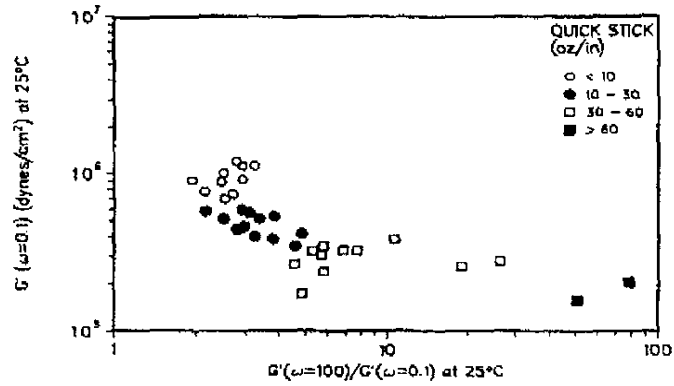


Fig. 8-32. Quick stick data vs. RDS data (NR/resin system).

polybutadiene domains (rubbery domains) and a T_g at 100°C relates to the polystyrene domains (endblock) in the block copolymer. Consequently, the Kraton block copolymer-resin blends also have two glass transition temperatures. The two T_g of block copolymer vary depending on the structure and molecular weight of the modifying resin.

The curves in Figure 8-35 show the $\tan \delta$ and G' values of the Kraton block copolymer as a function of temperature. In general, three different phenomena can be observed from blends of block copolymer with various resins.

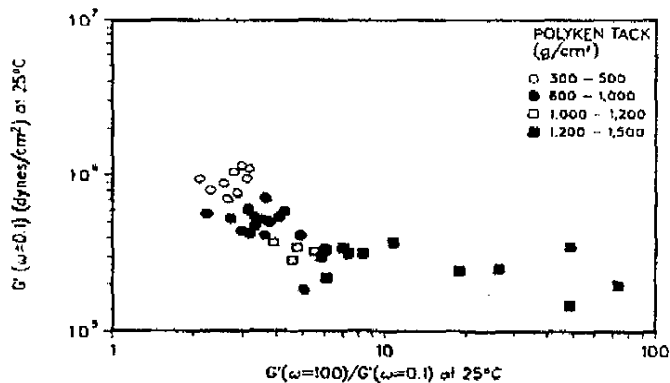
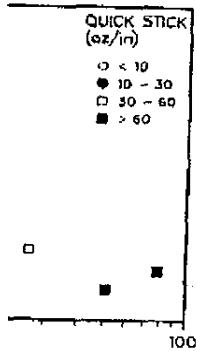


Fig. 8-33. Polyken tack data vs. RDS data (NR/resin system).

R_e

R_e

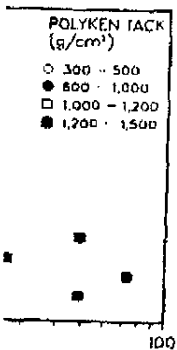
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100
resin system).

at 100°C relates to the polymer. Consequently, the glass transition temperatures, the structure and molecular

G' values of the Kraton blends, three different phenomena with various resins.



100
in system).

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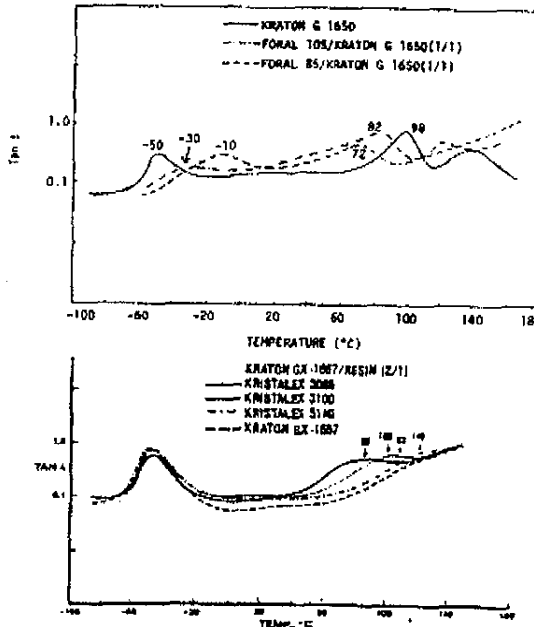


Fig. 8-34. Dynamic mechanical properties of rubber-resin blends.

Resin Group 1 (midblock compatible resin). These resins increase the midblock T_g of block copolymer without changing the T_g of the styrene domains, as they are compatible only with the midblock. These resins also simultaneously decrease the plateau modulus values. These are tackifying resins or midblock compatible resins because they reduce the room temperature modulus and, consequently, generate tack. Most aliphatic and cycloaliphatic resins belong to this group.

Resin Group 2 (endblock compatible resin). These resins increase the endblock T_g of the block copolymer without changing the T_g of the midblock domain. These resins also simultaneously increase (slightly) the modulus values of the block copolymer up to about 150°C (depending on the T_g of the resin). They are endblock reinforcing resins, and they increase high temperature performance when blended with block copolymer along with midblock resins. Most of these products are high softening point (>140°C) aromatic resins.

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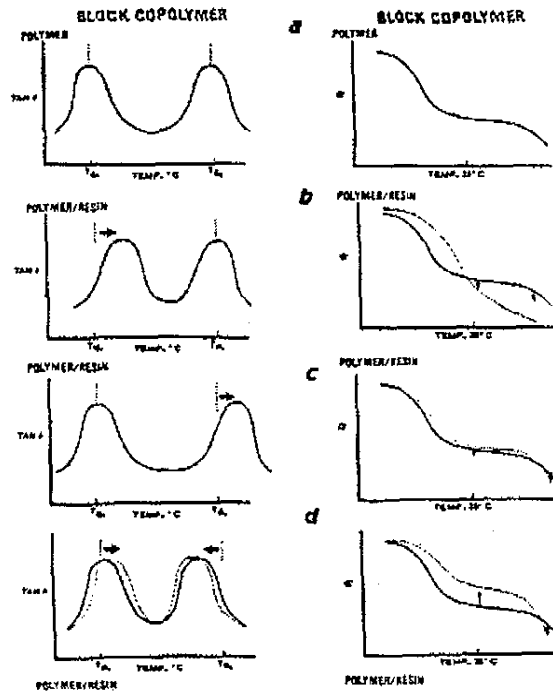


Fig. 8-35. Rubber-resin compatibility.

Resin Group 3 These resins are compatible with both blocks of the copolymer. Therefore, they increase the T_g of the midblock and decrease the T_g of the endblock, depending on the molecular weight and T_g of the resin. In general, most low softening point aromatic resins are compatible only with the endblock and consequently decrease the T_g of the end block. However, low molecular weight fractions of these resins may also be compatible with the copolymer midblock. Thus, the midblock T_g is also raised slightly. Rosin esters are typical of resins that are compatible with both the midblock and endblock.

Table 8-6 summarizes the experimental data on blends of Kraton G1650 (SEBS) and various Hercules resins. Regalrez resins are cycloaliphatic resin with various molecular weights (Table 8-5). The last three numbers in the resin name indicate the softening point and the first number indicates the degree of

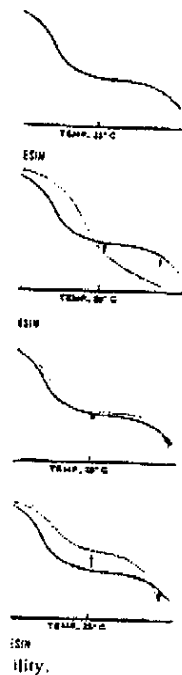
Midblock Rubber

End block Rubber

hydrogenated from pure Regalite resin (temperature sec). The GX1657, (The d polarizability compatible with are compatible weight of t weight alip rez 1018 & 6108, which point, is al-

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with both blocks of the copolymer and decrease molecular weight and T_g of aromatic resins are compatibly decrease the T_g of the midblock. Thus, the midblock is typical of resins that are block.

on blends of Kraton G1650 resins are cycloaliphatic resin at three numbers in the resin number indicates the degree of

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Table 8-6. Glass Transition Temperatures of Kraton/Resin Blends

KRATON G 1650		MIDBLOCK T_g (°C)	END BLOCK T_g (°C)	
Midblock Rubber/resin (10/10)	Regalrez	1018	-50	
		1033	-23	
		1065	-20	
		1078	-8	
		1094	2	
		1126	8	
		3102	28	
		6108	-45	
		7070	-10	
		1100	-9	
		85	-10	
		105	-30	
End block Rubber/resin (70/30)	Piccotac	95 BHT	10	
		Piccopalo	100	
		Piccolyte A 115	-3	
		Piccolyte S 115	20	
		Kristalex	20	
		3085	-50	
		3100	-50	
		1120	-50	
		5140	-50	
		Piccotex	LC	-45
			100	-50
			120	-50
155	-50			
ENDEX	160	-50		
	371	-50		
		100	84	
		85	85	
		95	95	
		100	100	
		100	100	
		100	100	
		85	85	
		80	80	
		100	100	
		70	70	
		83	83	
		100	100	
		100	100	
		100	100	
		72	72	
		83	83	
		102	102	
		108	108	
		76	76	
		79	79	
		88	88	
		110	110	
		113	113	
		82	82	

hydrogenation. Piccolastic, Kristalex, and Piccotex are aromatic resins prepared from pure monomers, such as styrene, vinyl toluene, and α -methylstyrene. Regalite resins are hydrogenated C_9 resins. These data were obtained from a temperature sweep using the Rheometrics Dynamic Spectrometer ($\omega = 10$ rad/sec). The data can be used for the other Kraton samples (SEBS), such as GX1657, G1652, and G1726X.

The data indicate that the rubber-resin compatibility depends on the resin polarizability and molecular weight. Cycloaliphatic and aliphatic resins are compatible with isoprene and ethylene-butylene midblocks, and aromatic resins are compatible with end blocks of the copolymer. However, if the molecular weight of the resin is low, the preceding rule is not valid. The low molecular weight aliphatic resins (Piccolastic A5 and A25) and cycloaliphatic resins (Regalrez 1018 and 1033) are soluble in both blocks of the copolymer. Regalrez 6108, which is a 60% hydrogenated cycloaliphatic resin with a 108°C softening point, is also compatible with both blocks of the copolymer.